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ABSTRACT

A study was conducted at Thomas Nelson Community College (TNCC) to assess the college's economic impact on its service area in fiscal year 1979. Models, based on linear cash flow formulas, were used to determine impacts on local businesses, governments, and individuals. Students' expenditures and spending for construction were omitted from the study. The study revealed: (1) $2,255,559 were added to the local business economy by college-related spending; (2) $1,207,559 worth of business property existed in support of college-related spending; (3) the credit base of local banks expanded by $1,317,723 because of the accounts of the college, its employees, and college-related businesses; (4) $37,575 of local business volume were unrealized due primarily to the operation of TNCC's bookstore; (5) $6,924,636 in tax receipts and state and federal aid were brought the area by the college; (6) $313,966 were spent by local jurisdictions in providing services to TNCC; (7) $626,913 worth of local government property existed in support of TNCC and its staff; (8) $48,276 in property taxes were lost due to the tax exempt status of TNCC; (9) TNCC provided 361 full-time jobs; and (10) these jobs generated $6,270,889 in personal income. The study report explains the models used in the calculations. (JP)

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AN ESTIMATE OF THE ECONOMIC IMPACTS OF THOMAS NELSON COMMUNITY COLLEGE

BY

Thomas E. Butler

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Office of Institutional Research

Thomas Nelson Community College

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AN ESTIMATE OF THE ECONOMIC IMPACTS

OF

THOMAS NELSON COMMUNITY COLLEGE

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Office of Institutional Research
January 1980

Thomas Nelson Community College
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EXECUTIVE SUMMARY

This study is an attempt to estimate some of the more direct economic costs and benefits to the Peninsula economy that result from the operation of Thomas Nelson Community College.

The purpose of the study is not so much to prove that TNCC has a favorable impact on the local economy (which it does), as it is to draw attention to the many and varied ways in which TNCC has impacts on the local economy. The citizens of the community, and even the college itself, may tend to overlook or take for granted these seemingly mundane economic impacts. By identifying them, perhaps there will be a greater awareness of TNCC's role in the Peninsula economy.

The method employed to assess these economic impacts is modeling. Models are simplifications of reality; as such they include only the elements of reality which are essential for analyzing the problem. The non-essential elements which tend to confuse and distract us, are discarded. The models used in this study are simple, straightforward analyses of cash flows: they tell us who is spending what, where.

The results of this study can perhaps be best conveyed by examining the answers to the following questions:

1. What was the impact on the local business economy of the expenditures of TNCC and its faculty and staff?

   $466,163 in local expenditures by the college, plus $1,268,882 in local expenditures by faculty and staff, which is spent and respent for a total of $2,255,559 added to the economy by the college.

2. How much Peninsula business property exists in support of the expenditures of TNCC and its faculty and staff?

   $1,207,327, of which $936,660 is the value of business real property committed to college-related business, and $270,667 is the value of local business inventory committed to college-related business.

3. How much was the credit base of local banks expanded due to the presence of the college and its faculty and staff?

   $1,317,723 because of the checking and savings account of the college, its employees, and college-related businesses.

4. How much business volume was foregone in the business sector due to the operation of the college?

   $37,575, chiefly due to the operation of the bookstore.

5. How much tax revenue and state and federal aid was received by the Peninsula because of the presence of the college?

   $6,924,636 from real estate and personal property taxes paid by faculty and staff, state aid to schools because of faculty and staff children in attendance, federal revenue sharing received due to the presence of faculty and staff households, federal aid to TNCC, and state aid to TNCC.

6. How much did it cost Peninsula local jurisdictions to provide services for the college and its employees?

   $313,966, $172,821 of which was the cost of municipal services, and $141,145 was the cost of public school services.

7. What is the value of local government property which exists to support the college and its faculty and staff?

   $626,913, of which $109,778 is municipal property and $517,135 is school property.

8. How much real estate taxes are foregone by the City of Hampton due to TNCC's tax exempt status?

   $48,276

9. How many full-time jobs exist on the Peninsula because of the operation of TNCC?

   361

10. How much personal income exists on the Peninsula due to the operation of the college?

    $6,270,889

The answers to the ten questions are estimates, based on fiscal year 1979 data. It is felt, however, that these impacts are representative of the impacts one would find in any year of operation for TNCC. When considered in this fashion, the precise dollar values determined by the models become less important than the direction of the impacts (positive or negative) and their relative magnitudes. On balance TNCC is obviously an integral part of the local economy and one would expect it to continue to be in the future.

The college has other impacts on the Peninsula: social, cultural and educational. This study recognizes their existence, but makes no attempt to measure them. They simply are not within the scope of this study. Recognizing that such benefits exist <u>in addition</u> to the benefits measured in this study only serves to point out what a valuable asset TNCC is to the Peninsula.

I. INTRODUCTION

This study attempts to assess the economic impacts of Thomas Nelson Community College on its service area in fiscal year 1979. (See Illustration 1 for a map of TNCC's service area.) That colleges have such impacts and that the impacts are positive can hardly be disputed in light of recent research findings (Selgas, Saussy & Blocker, 1973; Wellsfry, 1976; Phillips, 1977; Owings, 1977; Linthicum, 1978). The findings of this report certainly support such claims. It is not, however, the purpose of this report to add to the growing body of research in this area, but to identify the economic impacts TNCC has on its service area so that members of the community might be more aware of the effect of TNCC on the local economy.

TNCC, as this report demonstrates, is a vital part of the Peninsula economy. The direct economic benefits of the college far outweigh the direct economic costs. Without diminishing the importance of this fact, it should be clearly stated that providing positive economic impacts is not our main goal at TNCC -- our mission is still to provide "a comprehensive community college education to the residents of the Virginia Peninsula" (TNCC Office of Institutional Research, 1979; emphasis added). But in the process of pursuing our mission, we impact on the community's economy in a positive way.

To determine the economic impacts of TNCC on the Peninsula a modified version of the set of models developed by John Caffrey and Herbert H. Isaacs (1971) was employed. The findings are not comprehensive, in-depth benefits and costs of a particular year (in this case, fiscal year 1979) but instead represent the approximations of some of the more direct costs and benefits

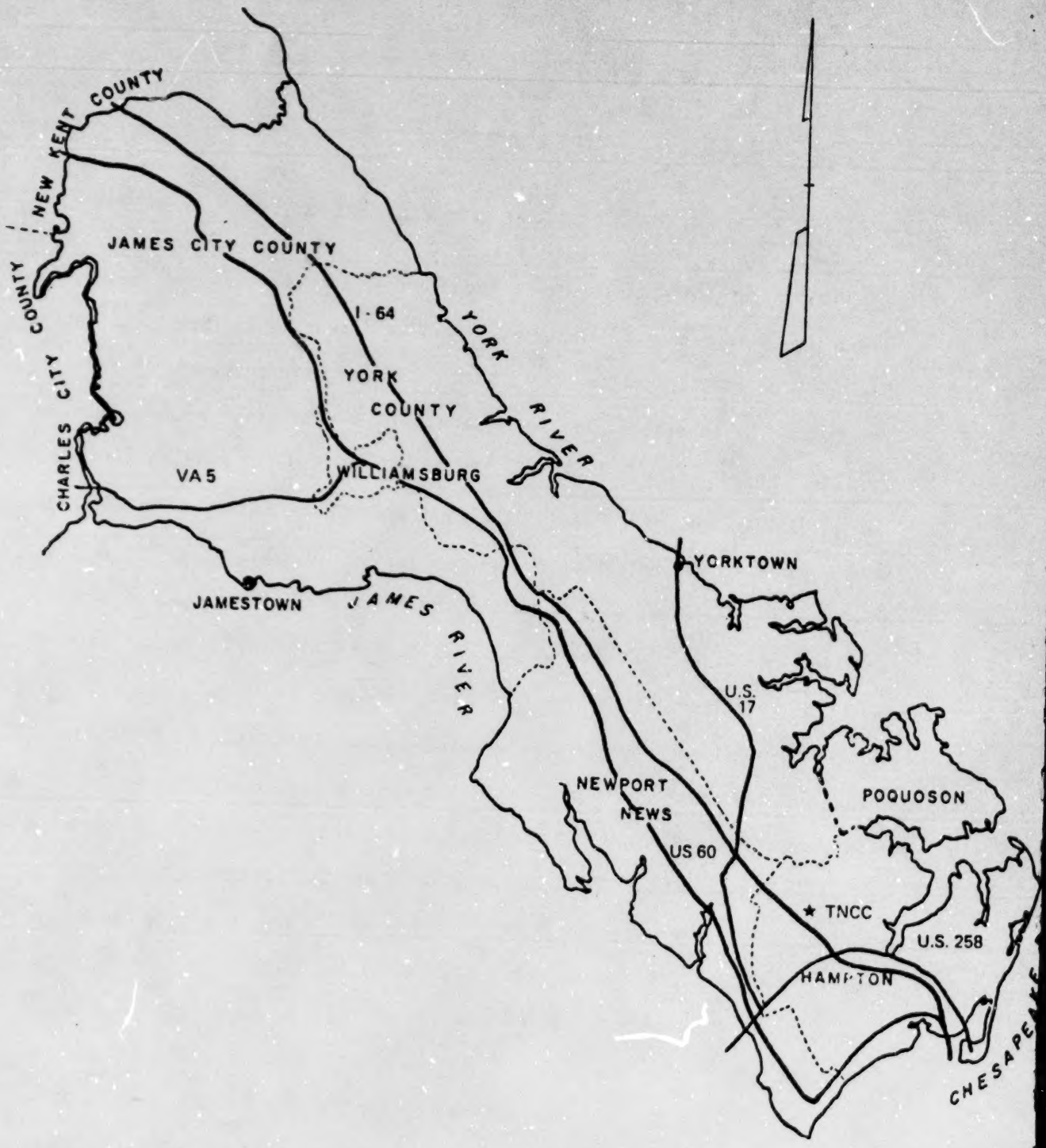

Illustration 1

TNCC Service Area

of TNCC in what is felt is a "typical" year. The models are linear cash flow formulas, useful in estimating short term impact (Caffrey and Isaacs, 1971). They are designed to underestimate, rather than overestimate, the economic impacts of the college whenever precise figures cannot be obtained. Where such underestimation is present in the findings of this project, it will be pointed out.

By way of example, one such underestimation of TNCC's impact on the local economy lies with the exclusion of the economic impacts of students' expenditures. Many similar studies have included such impacts and it seems likely that the spending of TNCC students would have a favorable impact on the community. Student expenditures have not been included here because of the distinct possibility that a portion of the students' spending would take place even if Thomas Nelson Community College did not exist, due to the many postsecondary educational opportunities afforded Peninsula residents. The proposition that all or most of TNCC's students would leave the service area if TNCC closed its doors cannot reasonably be supported. Rather than overestimate the impact of students' spending, it has been excluded.

Another underestimation results from not including the impact of expenditures for construction at the college, some $3,680,274 in fiscal year 1979. Such capital expenditures on new construction have been expended in several years of TNCC's existence. The 1979 construction expenditures were omitted, however, because projections of stabilizing future enrollments and increasing budgetary austerity lessen the likelihood of such expenditures being "typical" in the future.

A word of caution regarding the data collection should be mentioned. This study makes use of data supplied by TNCC; supplied by local government agencies;

and found in the literature in general. Estimates based on similar studies, aggregate data, and judgement were necessary. Actual figures were available for most of the information, however, and where estimates are used they err on the side of underestimation.

As a final word of caution, please note that TNCC has impacts on its service area. The word is intentionally plural; it is impossible to add all of the benefits, subtract out all the costs, and come up with one figure. Such a practice would result in counting some expenditures and costs more than once. Further, it would mean adding or subtracting stock and flow items together, which theoretically should not be done.

II. THE MODELS AND FINDINGS

The models employed in this study are designed to assess the impacts of TNCC on local businesses, on local governments, and on local individuals. The models used analyze cash flows. Originally developed by John Caffrey and Herbert Isaacs (1971) for the American Council on Education, these models have been tailored to individual research needs and employed in a number of studies (Selgas, Saussy, and Blocker, 1973; Moore, 1975; Manning, 1975; Phillips, 1977; Owings, 1977; Baum, 1978; Linthicum, 1978; and others). Their purpose is to determine who is spending how much, and where. An overview of the impacts developed by the models is presented in Illustration 2.

This chapter will present the models and submodels of each sector with computations and explanations of the data. The chapter is organized along the lines of an outline, with capital letters denoting a sector that is impacted on; arabic numbers, a primary model or type of impact within a sector; lower case letters, a submodel of a primary model; arabic numbers in parentheses, a sub-model of a submodel; and lower case letters in parentheses, when still further division is necessary.

A. Business Sector

1. College-Related Local Business Volume - BVCR

Model BVCR and its submodels assess the total impact of local expenditures by the college and its faculty and staff, and by local businesses in support of their college-related business volume.

$$\begin{aligned} BVCR &= M \times ELCR \\ &= 1.3 \times \$1,735,045 \\ &= \$2,255,559 \end{aligned}$$

Variables:

M = multiplier effect (see Appendix A)
ELCR = college-related local expenditures

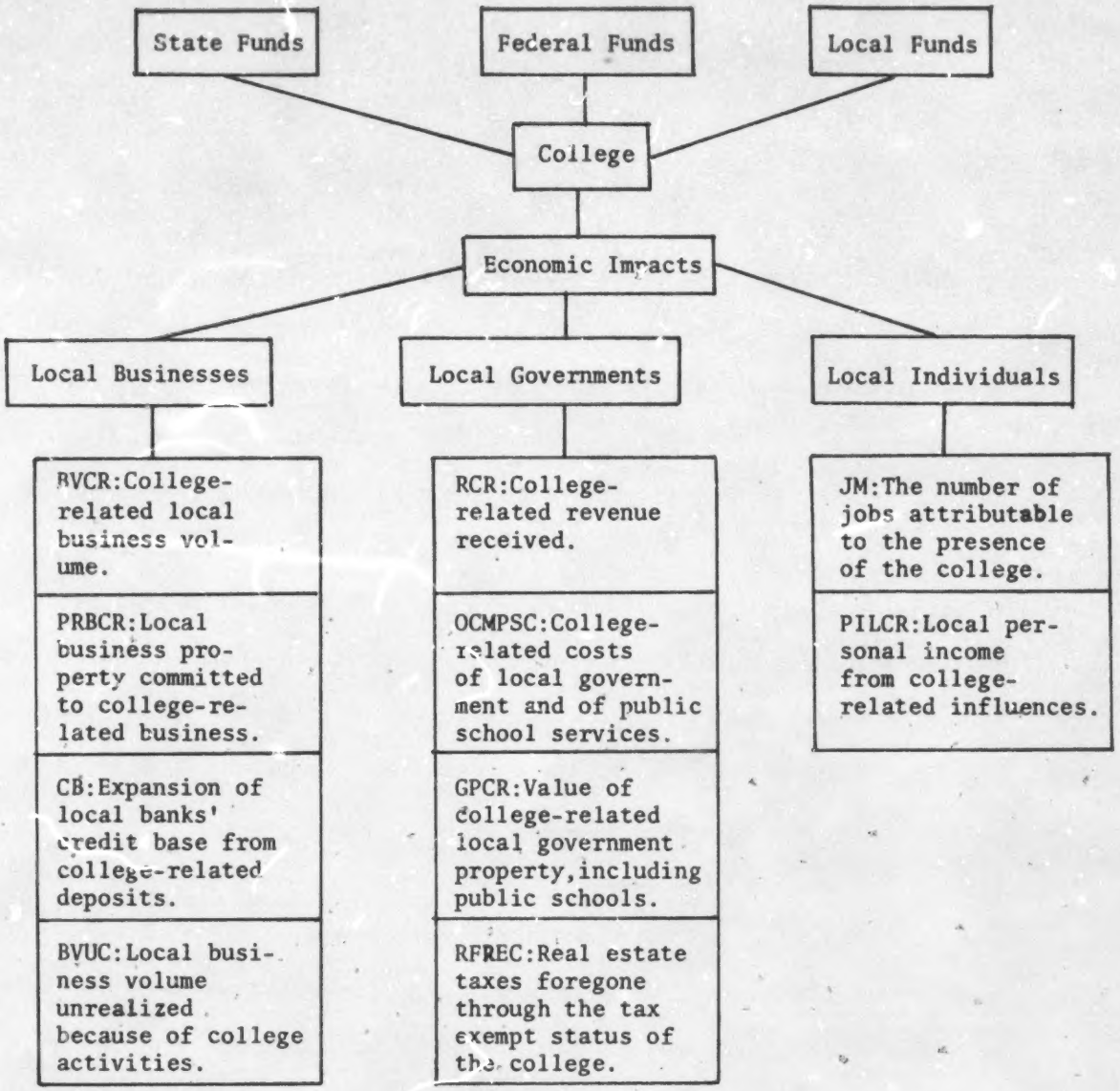
State Funds
Federal Funds
Local Funds
College
Economic Impacts
Local Businesses
Local Governments
Local Individuals
RVCR:College-related local business volume.
PRBCR:Local business property committed to college-related business.
CB:Expansion of local banks' credit base from college-related deposits.
BVUC:Local business volume unrealized because of college activities.
RCR:College-related revenue received.
OCMPSC:College-related costs of local government and of public school services.
GPCR:Value of college-related local government property, including public schools.
RFREC:Real estate taxes foregone through the tax exempt status of the college.
JM:The number of jobs attributable to the presence of the college.
PILCR:Local personal income from college-related influences.

Illustration 2.

Impacts on local businesses, local governments, and local individuals

a. College-Related Local Expenditures - ELCR

The college-related expenditures include expenditures by the college as an institution and expenditures by faculty and staff.

$$\begin{aligned} ELCR &= ELC + ELF \\ &= \$466,163 + \$1,268,882 \\ &= \$1,735,045 \end{aligned}$$

Variables:

ELC = local expenditures by college
ELF = local expenditures by faculty and staff

(1) Local Expenditures by the College - ELC

The college purchases goods from local and non-local businesses. The proportion of local spending was determined by sampling the college's vendor records excluding wages, salaries and internal items. Wages and salaries will be dealt with in other models. Total college expenditures were taken from the VCCS Financial Report, Fiscal Year 1979. To that figure of $6,360,284 was added $31,000 estimated by the TNCC Business Office as the amount of additional expenditures of the Local Board for a total of $6,391,284. Gross compensation according to the Office of the Dean of Financial and Administrative Services came to $4,564,224. Adjunct and overload pay of $199,735 was subtracted for a total of $4,364,489. Adjunct and overload pay are grouped together by the college for accounting purposes. Overload pay is earned by full-time faculty for teaching a greater than normal course load. The figure was subtracted from gross income so as not to include the impact of part-time(adjunct)

employees whose primary impact on the local economy cannot be traced back to TNCC. Since some full-time earnings were also excluded in the process the resultant figure of $4,364,489 represents an underestimation of gross income.

ELC = eLC x (EC - WF)
= .23 x ($6,391,284 - $4,364,489)
= $466,163

Variables:

eLC = proportion of total college expenditures that are local excluding compensation and internal items
EC = total college expenditures
WF = gross compensation to faculty, staff

(2) Local Expenditures by Faculty and Staff - ELF

This model examines several types of expenditures by faculty and staff: rental housing of local faculty and staff, non-housing expenditures of local faculty and staff, and non-housing expenditures by faculty and staff who live outside the service area. Expenditures for local owner-occupied housing by faculty and staff are considered in a subsequent model of the value of real property related to the college.

ELF = EHF + ENHF + ELNLF
= $833,944 + $436,908 + $28,912
= $1,268,882

Variables:

EHF = expenditures by faculty and staff for rental housing
ENHF = non-housing expenditures by faculty and staff on the Peninsula
ELNLF = local expenditures by non-local faculty and staff

The housing expenditures of homeowners are not included here since they are primarily a capital rather than a current transaction. Underestimation of housing expenditures may result from the exclusion of such current housing expenditures as payments to real estate brokers and payments of homeowners' insurance premiums.

(a) Rental Housing Expenditures of Faculty and Staff - EHF

Both this model and the model for non-housing expenditures assume that all income earned by faculty and staff is spent. Where savings exist the impact is overestimated by the model; where income is supplemented by income of other family members, or from dividends, royalties, or pensions the impact is underestimated. The net effect is most likely underestimation.

$$EHF = f1 \times fH \times DIF \times eH$$
$$= .92 \times .43 \times \$3,055,142 \times .69$$
$$= \$833,944$$

Variables:

- f1 = proportion of faculty and staff residing on the Peninsula
- fH = proportion of faculty and staff who rent housing
- DIF = total disposable income of faculty and staff
- eH = proportion of a tenant's total expenditures likely to be spent for rental housing

(b) Non-Housing Expenditures by Local Faculty and Staff - ENHF

ENHF = f1 x eL x DIF x eNHF
= .92 x .54 x $3,055,142 x .31
= $470,516

Variables:

f1 = proportion of faculty and staff residing on the Peninsula
eL = proportion of total non-housing expenditures that an individual is likely to make in his local environment
DIF = total disposable income of faculty and staff
eNHF = proportion of a consumer's total expenditures spent on non-housing items

The proportion of faculty and staff residing locally was obtained from the Thomas Nelson Community College Directory, 1978-79. In the absence of data about housing characteristics of faculty and staff, it is assumed that the same proportion of them rent as do the Peninsula population. Housing statistics of home owners and renters for the Peninsula communities were obtained from the Peninsula Planning District Commission. In 1978, 50,889 out of 118,117 household rented, for a proportion of .43.

Total disposable income was calculated as 70% of gross income, based on information supplied by TNCC Personnel Office. The proportion likely to be spent for rental housing or for non-housing expenditures was estimated from "Urban Family Budget Updated to Autumn 1975" (Weir, 1976), a Bureau of Labor Statistics report.

The proportion of non-housing expenditures made locally was estimated by the ratio of 1978 Retail Sales for the Peninsula (excluding Williamsburg) to Net Effective Buying Income (EBI)

for the same area, as supplied by the Peninsula Chamber of Commerce. EBI is personal income (wages, salaries, interest, dividends profits, and property income) minus federal, state, and local taxes. Williamsburg was excluded from determining this proportion because it is an economy dominated by tourism, with a disproportionate share of its retail sales made by non-local individuals. For all other communities it is assumed that the amount of retail sales by non-locals is offset by retail sales in other areas by local individuals.

(c) Local Expenditures by Non-Local Faculty and Staff - ELNLF

Faculty and staff commuting into the Peninsula make some purchases on the Peninsula: gasoline, food, clothing, etc.

$$\begin{aligned} ELNLF &= (1 - fL) \times F \times EIF \\ &= .08 \times 278 \times \$1300 \\ &= \$28,912 \end{aligned}$$

Variables:

fL = proportion of faculty and staff residing locally

F = total number of faculty and staff

EIF = estimated average local expenditures by each non-local faculty and staff

The total number of faculty and staff was taken from the roster of full-time employees in the TNCC Directory, 1978-79. Average local expenditures by non-local faculty and staff were determined through informal survey.

2. Local Business Property Committed to College-Related Business - PRBCR

$$PRBCR = RPBCR + IBCR$$
$$= \$936,660 + \$270,667$$
$$= \$1,207,327$$

Variables:

RPBCR = value of Peninsula business property committed to college-related business
IBCR = value of local business inventory committed to college-related business

a. Peninsula Business Property Committed to the College - RPBCR

The dollar value of local businessess' real property that is used to service college-related sales is estimated by this model

$$RPBCR = \frac{BVCR}{BVL} \times VB$$
$$= \frac{\$2,255,559}{\$2,695,876,235} \times \$1,170,824,826$$
$$= \$936,660$$

Variables:

BVCR = college-related business volume on the Peninsula
BVL = Peninsula business volume
VB = assessed valuation of local business real property

Data regarding the true market value of business property is not available for the Peninsula. Assessed valuation of business property is used to estimate the market value, but results in an underestimation due to present rising property prices and infrequency of reassessments. Data on real property is not broken down into business and residential components for most Peninsula communities. An estimated proportion of total property tax that is attributable to business was obtained from the 1977 Census of Government publication, Taxable Property Values and Assessment/Sales Ratios, Volume 2. See Appendix B for a more complete determination of variable VB.

The Peninsula business volume is estimated from the sum of retail sales, selected services, wholesale sales, and and value-added by manufacturing. See Appendix C for the derivation of variable BVL.

b. Local Business Inventory Committed to College-Related Business - IBCR

The value of inventory required to support college-related expenditures is determined by multiplying total college-related business volume by the estimated average inventory-to-business volume ratio for local businesses.

$$\begin{aligned} IBCR &= ibv \times BVCR \\ &= .12 \times \$2,255,559 \\ &= \$270,667 \end{aligned}$$

Variables:

ibv = inventory to business volume ratio
BVCR = college-related business volume

The ratio of inventory-to-business is computed from business income tax returns in the U. S. Internal Revenue Service's Statistics of Income (1975).

3. Expansion of Local Banks' Credit Base from College-Related Deposits - CB

A bank's credit base depends on the average level of time and demand deposits, subject to reserve requirements imposed by the Federal Reserve.

$$\begin{aligned} CB &= (1 - t) \times [TDC + (TDF \times F)] \\ &\quad + (1 - d)[DDC + (DDF \times F) + (cbv \times BVCR)] \\ &= (1 - .97)[\$207,234 + (\$978,684 \times 278)] \\ &\quad + (1 - .90)[\$93,124 + (\$191,820 \times 278) + (.037 \times \$2,255,559)] \\ &= \$1,317,723 \end{aligned}$$

Variables:

t = time deposit reserve requirement
TDC = average time deposit of the college in local banks
TDF = average time deposit of faculty and staff in local banks
F = number of faculty and staff
d = demand deposit reserve requirement
DDF = average demand deposit for faculty and staff in local banks
cbv = cash to business volume ratio
BVCR = college-related business volume
DDC = average demand deposit of the college in local banks

The average time and demand deposits of the college were based on information supplied by the bank where the college's funds are held. Local reserve requirements for time and demand deposits were obtained from bank officials. Average time and demand deposits for faculty and staff were assumed to be the same as for the nation. Using average salary figures supplied by TNCC's Office of the Dean of Finance and Administrative Services for nine-month faculty ($15,368), twelve-month faculty ranked personnel ($21,246), and classified employees ($9,211), a weighted average, by number of employees in each classification, of demand and time deposits was calculated from the Federal Reserve Technical Papers (1966).

4. Local Business Volume Unrealized Because of College Activities = BVUC

Model BVUC estimates the value of college receipts from the college-run bookstore, which could be seen as being in competition with other bookstores in the local area. When viewed in such a manner, the operation of the bookstore has a negative impact on local businesses.

BVUC = $37,575

This figure represents gross revenues of the College Bookstore as provided by the TNCC Business Office.

B. Government Sector

In addition to having impacts on the local business sector, TNCC has impacts on local governments as well. The models and sub-models which follow analyze the effect of the college on local government revenues and expenditures.

1. College-Related Revenue - RCR

This model measures the tax receipts and state and federal aid received by the Peninsula due to the college, its faculty and staff, and college-related business activities.

$$\begin{aligned} RCR &= RRECR + RNREF + RACH \\ &\quad + RFCR + RFC + RST \\ &= \$92,199 + \$50,596 + \$64,608 \\ &\quad + \$18,869 + \$569,704 \\ &\quad + \$6,924,636 \end{aligned}$$

Variables:

RRECR = college-related real estate taxes paid to local governments
RNREF = personal property taxes paid to local governments by faculty and staff
RACH = state aid to local schools due to the presence of the college
RFCR = federal revenue sharing to local governments due to the presence of the college
RFC = federal aid for TNCC
RST = state aid for TNCC

Federal and state aid figures (RFC & RST) were obtained from the VCCS Financial Report (1979).

a. College-Related Real Estate Taxes Paid to Local Governments - RRECR

Included in this model are the real estate taxes paid by faculty, staff, and local business due to their college-related business volume.

$$\begin{aligned} RRECR &= RREF + RREBCR \\ &= \$80,201 + \$11,998 \\ &= \$92,199 \end{aligned}$$

RREF = real estate taxes paid to local governments by local faculty and staff
RREBCR = real estate taxes paid to local governments by local businesses due to college-realted business

(1) Real Estate Taxes Paid to Local Governments by Local Faculty and Staff - RREF

$$RREF = FL \times (1 - fH) \times (PT \times VPR)$$
$$= \$80,201$$

FL = number of faculty and staff residing locally
fH = proportion of faculty and staff who rent housing
PT = local property taxes
VPR = average value of a private residence

Because tax rates vary by community on the Peninsula, RREF was determined for each community and then summed to find the total local RREF. It is assumed that faculty and staff live in housing of average value and rent in the same proportion as Peninsula residents in general. See Appendix D for a full development of RREF.

(2) Real Estate Taxes Paid to Local Governments by Businesses Due to Their College-Related Business - RREBCR

$$RREBCR = PT \times \left(\frac{BVCR}{BVL} \times VB \right)$$
$$= \$11,998$$

Variables:
PT = local property tax rate
BVCR = college-related local business volume
BVL = local business volume
VB = assessed valuation of local business real property

Variables BVCR, BVL, and VB have been calculated in earlier models. Due to the variation in local property tax rates, RREBCR must be calculated for each community and then summed to find the total local RREBCR. See Appendix E.

b. Non-Real Property Taxes Paid to Local Governments by Faculty and Staff - RNREF

$$RNREF = FL \times \frac{ROP}{TC}$$

$$= 257 \times \frac{\$23,253,688}{118,117}$$

$$= \$50,596$$

Variables:

FL = number of faculty and staff residing locally
ROP = total personal property taxes paid to local governments
TC = total number of households on the Peninsula

Total property taxes paid was found by summing the individual community collections (as provided by those communities).[1] The total number of households was provided by the Peninsula Planning District Commission. The model assumes college faculty and staff pay the same proportion of personal property taxes as do Peninsula residents in general.

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[1] Hampton, $5,885,150; Newport News, $7,800,894; Poquoson, $375,528; Williamsburg, $386,736; York County, $8,805,380; James City County, $1,631,840.

c. State Aid to Public Schools Due to the Presence of the College - RACH

This model estimates the state aid received by local public schools as a result of TNCC faculty and staff children attending those schools. State aid is directly related to the average number of children in attendance.

$$RACH = APS \times \left[\frac{(CHPS \div TC)\ (FL)}{CHPS}\right]$$

$$= \$32,304,382 \times \frac{(70,312 \div 118,117)\ (257)}{70,312}$$

Variables:

APS = total state aid to public schools
CHPS = total number of children attending local schools
TC = total number of local households
FL = number of faculty and staff residing locally

State aid to public schools was obtained from the various school boards and summed[1] as was the total number of children attending.[2] The numerator of the second half of the equation above is an estimation of the number of faculty and staff children attending public schools, based on the assumption that faculty and staff families are similar in this regard to the Peninsula population in general.

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[1] Hampton, $13,798,653; Newport News, $11,517,208; Poquoson, $1,306,512; Williamsburg, $118,193; York County, $3,906,717; James City County, $1,657,099.

[2] Hampton, 26,092; Newport News, 28,000; Poquoson, 2,281; Williamsburg-James City County, 4,860; York County, 9,079.

d. Federal Revenue Sharing to Local Governments Due to the Presence of the College = RFCR

Federal revenue sharing, which is allocated on a per capita basis, is in part received by local governments because of the presence of faculty and staff and their families.

$$RFCR = FHL \times \left(\frac{RF}{POPL}\right)$$

$$= 771 \times \frac{\$8,856,064}{349,600}$$

$$= \$18,869$$

Variables:

FHL = total number in local faculty and staff households
RF = federal revenue sharing received by local governments
POPL = total local resident population

Total number in local faculty and staff households assumes that the size of faculty and staff households is the same as the general population. The figure is obtained by dividing total population (349,600) by the number of households (118,117) which gives an average household size of 3. This is multiplied by the number of local faculty and staff (257) to arrive at FHL. Federal revenue sharing received by each city/county government was provided by the respective local governments and summed.[1] The total population figure was provided by the Peninsula Chamber of Commerce.

[1]Hampton, $3,494,000; Newport News, $3,855,712; Poquoson, $98,000, Williamsburg, $294,974; York County, $340,472; James City County, $472,906.

2. College-Related Costs of Local Government and Public School Services - OCMPSC

This model estimates the operating costs for city/county governments and public schools that result from the presence of the college and college-related persons.

$$\begin{aligned} OCMPSC &= OCMCR + OCPSCR \\ &= \$172,821 + \$141,145 \\ &= \$313,966 \end{aligned}$$

Variables:

OCMCR = college-related operating costs of municipal services
OCPSCR = college-related operating costs of local public school services

a. College-Related Operating Costs of Muncipal Services - OCMCR

$$\begin{aligned} OCMCR &= \frac{[(F \div POPL) + (FHL \div POPL)}{2} \times BMS \\ &= \frac{[(278 \div 349,600) + (771 \div 349,600)}{2} \\ &\quad \times 115,192,207 \\ &= \$172,821 \end{aligned}$$

Variables:

F = total number of faculty and staff
POPL = total local population
FHL = total number of persons in local faculty and staff households
BMS = local governments' operating budgets excluding public schools

All variables have been calculated with the exception of BMS. Values for BMS were obtained from each local city/county government and summed.[1] These values include expenditures made from locally collected revenues from each jurisdiction.

[1]Hampton, $44,600,000; Newport News, $48,188,123; Poquoson, $2,003,337; James City County, $6,421,000, Williamsburg, $6,400,000; York County, $7,579,747.

b. College-Related Operating Costs of Local Public School Services - OCPSCR

$$OCPSCR = \frac{CHPSF}{CHPS} \times BPS$$

$$= .002 \times \$70,572,648$$

$$= \$141,145$$

Variables:

CHPSF = total number of faculty and staff children attending local public schools

CHPS = total number of children attending public schools

BPS = total operating budgets for local public schools

The value for CHPSF is obtained from the numerator of the last half of equation RACH. CHPS is also found in that model. BPS is the sum of the individual BPS for each local public school system.[2] BPS represents expenditures from local funds only.

3. Value of College-Related Local Government Property, Including Public Schools = GPCR

Model GPCR attempts to estimate the dollar value of local government and public school capital facilities that exist in support of services provided to the college and college-related individuals. It is not a measure of the capital outlay necessary to provide such services (which would be beyond the scope of this study).

$$GPCR = [(\frac{OCMCR}{BMS}) \times GPM] + [(\frac{OCPSCR}{BPS}) \times GPPS]$$

$$= [(\frac{\$172,821}{\$115,192,207}) \times \$73,185,335] +$$

$$[(\frac{\$141,145}{\$70,572,648}) \times \$258,567,449]$$

$$= \$626,913$$

Variables:

OCMCR = college-related operating costs of municipal services

BMS = local governments' operating budgets excluding public schools

GPM = value of all local government property except public schools

[2] Hampton, $13,613,651; Newport News, $44,351,981; Poquoson, $3,052,282; York County, $3,733,415; Williamsburg-James City County, $5,821,319.

OCPSCR = college-related operating costs of local public schools
BPS = operating budgets for local public schools
GPPS = value of all local government property associated with public schools

All variables have been calculated in prior models except GPM and GPPS. GPM is the summation of the individual GMP's for each municipality.[1] Likewise, GPPS is the sum of the individual GPPS's for each school system.[2] Both variables represent underestimates. Since government property is not taxed, accurate assessed values are not maintained by local governments. Historical costs of properties, and estimates of value determined for insurance purposes, rather than actual value, were provided by some local governments.

4. Real Estate Taxes Foregone Through the Tax-Exempt Status of the College - RFREC

This model estimates the value of property taxes that the college would have to pay if it did not enjoy a tax-exempt status. The model assumes that college land is assessed at a value comparable to that of other land in the community. It should be noted that since the college is located in the City of Hampton, the value estimation of this model is a cost to the citizens of that city only.

$$RFREC = RRE_H \times \frac{GC}{GL_H}$$
$$= \$20,821,646 \times \frac{.13}{56.07}$$
$$= \$48,276$$

Variables:

RRE = total real estate taxes collected in Hampton
GC = geographical area of the college
GL_H = geographical area of Hampton, exclusive of the college

[1]Hampton, $52,000,000; Newport News, $5,470,000; Poquoson, $1,382,525, Williamsburg, $4,858,900; York County, $7,273,910; James City County, $2,200,000.

[2]Hampton, $127,008,316; Newport News, $104,634,918; Poquoson, $5,145,000; York County, $3,733,415; Williamsburg-James City County, $18,045,800.

The value of real estate taxes collected in Hampton was provided by the City of Hampton. The geographical area of the college was obtained from TNCC's Director of the Physical Plant. The Peninsula Chamber of Commerce provided the geographical area of the City of Hampton. It could be argued that the presence of the college benefits the tax rolls of the City of Hampton by increasing the assessed value of the surrounding land. Determining the value of this benefit is not within the scope of this study, however.

C. Local Individuals

The final sector of the local economy to be examined in light of impacts TNCC has is the individuals sector. The analysis here will center on two impacts: the increase in full-time jobs due to the operation of the college, and the total personal income level of the Peninsula due to college-related influences.

1. The Number of Jobs Attributable to the Presence of the College - JM

This model estimates both the number of jobs directly provided by the college, and those created indirectly in the business and government sectors by college-related activities.

$$JM = J \times F$$
$$= 1.3 \times 278$$
$$= 361$$

Variables:

J = employment multiplier
F = number of full-time faculty and staff

For an explanation of the multiplier concept, see Appendix A.

The value for F is obtained from previous equations.

2. Local Personal Income from College-Related Influences - PILCR

This model estimates total personal income of the Peninsula that results from college-related activities, by adding the direct income of TNCC employees and the income produced by college-related expenditures.

$$PILCR = (fL \times WF) + BVCR$$
$$= .92 \ (\$4,364,489) + \$2,255,559$$
$$= \$6,270,889$$

Variables:

fL = proportion of faculty and staff residing locally
WF = gross compensation to faculty and staff
BVCR = college-related local business volume

All variables have been determined in previous models. The model assumes all local college-related expenditures result in local income.

SUMMARY OF FINDINGS

In general terms, the findings of this study clearly indicate that Thomas Nelson Community College is a vital part of the Peninsula economy, interacting in a positive way with local businesses, local governments, including public schools, and with local individuals. In more specific terms, some of the more important impacts found in the study are enumerated below:

1. $2,255,559 impact on local businesses due to college-related spending.
2. $1,207,327 worth of business property exists in support of college-related spending.
3. $37,575 of local business volume was unrealized due to operation of the college bookstore.
4. The local credit base was expanded by $1,317,723 due to the presence of the college.
5. $6,924,636 in tax receipts, and state and federal aid, came to the Peninsula because of the college-related activities.
6. The cost to the Peninsula to provide government services to the college and its staff was $313,966.
7. $626,913 worth of local government and public school property exists in support of services provided for the college and its employees.
8. $48,276 in real estate taxes is foregone by the City of Hampton due to the tax exempt status of TNCC.
9. 361 full-time jobs on the Peninsula are attributable to the presence of the college.

10. $6,270,889 in personal income for Peninsula residents is generated by the existence of the college.

What these statistics reveal is that while there are economic costs to the community associated with the college and its employees, there are economic benefits as well, which are quite large, especially in relation to the costs. Moreover, the benefits are in addition to the educational, social, and cultural benefits one normally associates with the existence of the college.

APPENDIX A

The Multiplier

The concept of the multiplier is one long recognized in economic theory. It is based on the notion that expenditures in an economy result in income (or employment) for some members of the economy. This "additional" income (or employment) gives rise to further spending, generating still more income (or employment). This chain reaction process takes place with each succeeding round of spending and income generation diminishing in size.

The size of the multiplier is affected by the portion of income in each round which is set aside (saved) rather than spent, and by the amount of income which "leaks" out as spending into other economies. This can be affected by such variables as size of the economy, nature of the work force, and economic growth rates (Linthicum, 1978). The employment and expenditures multiplier for this study, 1.3, was selected based on previous studies of local economy multipliers (Linthicum, 1978), rather than generated from existing data.

APPENDIX B

Assessed Valuation of Local Business Property (VB)

Because tax rates vary by community on the Peninsula, the assessed value of business property (VB) was computed separately for each community and then summed to arrive at the total Peninsula VB. Because of insufficient data, no value for VB was computed for Poquoson. The data for the calculations are found in the following table:

City/County	Real Estate Taxes Collected	Local Tax Rate Per $100	% R.E.T.[1] Commercial & Industrial	Assessed Mkt Value (amv)	VB @100% amv
Hampton	$20,821,642	$1.56	19.0	100%	$363,951,200[2]
Newport News	$24,000,000	$1.40	29.7	100%	$509,142,850
Williamsburg	$ 1,460,655	$ .72	47.2	100%	$ 95,348,312
James City County	$ 3,288,250	$ .88	33.7	100%	$125,925,020
York County	$ 3,088,164	$4.70	12.8	11%	$ 76,457,444
Totals	$52,658,711				$1,170,824,826

VB is found through the following equation:

$$VB = \frac{[(\text{Total R.E.T.} \div \text{Tax Rate}) \times (100) \times (\%\text{R.E.T. Commercial})}{\text{amv}}$$

Source: Respective City/County Governments

[1]Source: "Statistics on Real Property Assessments and Measurable Sales During a Six-Month Period, for Selected Local Areas: 1976," 1977 Census of Governments, U. S. Department of Commerce, 1978.

[2]Statistic provided by City of Hampton, not calculated from data.

APPENDIX C

Local Business Volume (BVL)

The estimate of Local Business Volume (BVL) was assumed to be the sum of retail sales, selected services, wholesale sales, and value-added by manufacturing as revealed by census data. Because no more current data was available than 1972 figures, an index of 1976 to 1978 Peninsula tax receipts was used to weight the 1972 BVL. Computations were as follows:

71-72	Peninsula retail sales	$685,072,000[1]
71-72	Peninsula selected services	$121,551,000[1]
71-72	Peninsula wholesale sales	$216,938,000[2]
71-72	Value-added by Peninsula manufacturing	$458,500,000[3]
71-72	BVL	$1,482,065,000
1972	Peninsula sales tax receipts	$ 606,383,552[4]
1978	Peninsula sales tax receipts	$1,103,096,891[4]

$$\text{BVL} = \text{1972 BVL} \times \frac{\text{1978 sales tax receipts}}{\text{1972 sales tax receipts}}$$

$$= \$1,482,065,000 \times \frac{\$1,103,096,891}{\$606,383,552}$$

$$= \$2,695,876,235$$

[1]Source: 1972 Retail Trade Area Statistics and Selected Services.

[2]Source: 1972 Wholesale Trade Area Statistics.

[3]Source: 1972 Census of Manufacturing

[4]Source: Virginia Department of Taxation

APPENDIX D

Real Estate Taxes Paid to Local Governments by Faculty and Staff (RREF)

A value for RREF was calculated for each Peninsula community; total RREF is the sum of the individual RREF values. The equation for determining RREF is:

$$RREF = FL \times (1 - fH) \times (PT \times VPR)$$

The value of each variable for each local government is found in the table below, with the exception of fH (proportion of faculty and staff who rent housing) -- the Peninsula-wide proportion of .43[1] is applied to all local governments.

City/County	# of Local[2] Faculty & Staff	Property[3] Tax Rate	Avg. Value of[4] a Pvt. Residence	Community RREF
Hampton	101	$.0156	$39,027	$35,050
Newport News	115	$.0140	$40,037	$36,742
Williamsburg	11	$.0072	$52,000[5]	$ 2,347
James City County	1	$.0088	$52,000[5]	$ 261
York County	17	$.0052	$51,911	$ 2,616
Poquoson	12	$.0075	$62,086	$ 3,185
Totals	257	-	-	$80,201

[1]Source: Peninsula Planning District Commission.

[2]Source: TNCC Faculty and Staff Directory, 1978-79.

[3]Source: Respective Local Governments

[4]Source: Hires Report, 4th Quarter 1978. Mean selling price is used as a proxy for average value.

[5]Source: Teagle Realty, Williamsburg Office; estimate based on judgement.

APPENDIX E

Real Estate Taxes Paid to Local Governments By Businesses Due to their College-Related Business (RREBCR)

A value for RREBCR was calculated for each local community; the Peninsula RREBCR is the sum of the individual values for RREBCR. RREBCR may be found through the following equation:

$$RREBCR = PT \times [(\frac{BVCR}{VBL} \times VB)]$$

In computing the separate community RREBCR's a constant Peninsula-wide value for $\frac{BVCR}{VBL}$ is used, equal to .0008. Values for the two variables in this ratio were derived in earlier models. Values for the remaining variables are found in the following table:

City/County	PT Local Property[1] Tax Rate	VB Assessed Value[2] of Business Real Property	RREBCR
Hampton	$.0156	$363,951,200	$4,542
Newport News	$.0140	$509,142,850	$5,702
Williamsburg	$.0072	$ 95,348,312	$ 549
James City County	$.0088	$125,925,020	$ 887
York County	$.0052	$ 76,457,444	$ 318
TOTALS		$1,170,824,826	$11,998

Note: No value for VB or RREBCR could be obtained for Poquoson.

[1]Source: Respective city/county governments.

[2]Source: Appendix D.

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